REPORT NO. 84-2-6
ALEXANDRIA FIELD OFFICE

3430
DECEMBER 1983

BIOLOGICAL EVALUATION OF SOUTHERN PINE BEETLE ON THE CATAHOULA AND WINN RANGER DISTRICTS, KISATCHIE NATIONAL FOREST

by

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Abstract

A biological evaluation of southern pine beetle (SPB) infestations was conducted on approximately 165,291 acres of the Winn and Catahoula Ranger Districts, Kisatchie National Forest in Louisiana. During October 1983, the Districts had a total of 52 multiple tree spots. A total of 109,255 acres of susceptible host type is in SPB infested compartments on the Districts. There are 0.48 spots per 1,000 acres of host type in infested areas. The level of activity is such that a SPB suppression project could be justified.

INTRODUCTION

A biological evaluation was conducted on the Catahoula and Winn Ranger Districts of the Kisatchie National Forest to determine the status of southern pine beetle (Dendroctonus frontalis Zimm.) populations. A District forester and forestry technicians from the Southern Forest Experiment Station conducted the aerial survey. Entomologists and biological technicians from State and Private Forestry, Forest Pest Management (FPM), Alexandria, LA, Field Office conducted the evaluation on October 24-25, 1983.

Since the late 1960's, the southern pine beetle (SPB) has been a problem in Louisiana. During this time, SPB populations have periodically fluctuated between endemic and epidemic status. The last major outbreak of SPB on the Kisatchie National Forest occurred in 1976-77 (Drake 1976).

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TECHNICAL INFORMATION

The southern pine beetle attacks all species of southern yellow pine. On the Kisatchie National Forest, loblolly pine, Pinus taeda L., and shortleaf pine, Pinus echinata Mill., are the preferred hosts.

Type of Damage

Damage caused by the southern pine beetle is tree mortality resulting from adult beetles constructing egg galleries in the cambial region of the host trees. Blue staining fungi (Ceratocystis spp.) introduced by the beetles and secondary insects accelerate tree death by blocking the vascular system of the tree.

Life Cycle of the Insect

The beetles attack and construct winding egg galleries in the cambium. Eggs are deposited along the galleries. White larvae hatch from the eggs and further mine the cambium and then construct pupal cells in the outer bark. After transforming to adults, the beetles emerge. During the warmer months, the life cycle is completed in about 30 days. There may be as many as seven generations each year.

METHOD OF EVALUATION AND ANALYSIS OF SPB INFESTATION

Aerial Survey and Ground Checks

Standard aerial sketch map procedures were used for this evaluation, except survey coverage was 100 percent. Aerial surveys were conducted by a District forester and forestry technicians from the Southern Forest Experiment Station on October 14, 1983. Only the Catahoula and southern portion of the Winn RD were flown. Spots of red and fading trees were recorded and plotted on Forest Service Class A maps.

Numbers of vacated and infested trees, brood stage, basal area, age, height, DBH, percentage of the stand in sawtimber, landform, and radial growth were recorded for 11 of the spots during the ground phase of the evaluation. This information was used to run the benefit/cost analysis and to hazard rate the stands.

Hazard Rating

All the SPB infested stands were hazard rated at the time of ground checking. The system used was developed on the Kisatchie National Forest by Dr. Peter Lorio of the Southern Forest Experiment Station. It is designed for use by the National Forests in Region 8 and utilizes field data collected by the prescriptionist (FSH 2409.21d, R-8, Kisatchie National Forest Supplement No. 7).

Suppression Project Criteria

Decisions to initate a SPB suppression project are based on the following criteria:

- Number of SPB spots per 1,000 acres of susceptible host type.

  This figure provides an indication of current levels of SPB activity. One multiple tree spot/1,000 acres of susceptible host type has historically been considered the lower threshold of a SPB epidemic. To determine the number of acres of susceptible host type, the Continuous Inventory of Stand Conditions (CISC) data for the Kisatchie National Forest were used. The number of acres of shortleaf-oak, loblolly-hardwood, loblolly, shortleaf, and bottomland hardwood-yellow pine were determined (forest type codes 12, 13, 31, 32, and 46). Regeneration, seedling-sapling, and sparse stand acreage were subtracted from the total as these areas have little chance of sustaining large losses to SPB.

- Green tree:red tree ratio

  This number, based on the number of green infested trees to the number of red and fading infested trees, provides an indication of how rapidly a SPB spot is expanding at the time of ground check.

- Potential spot growth

  The Arkansas Model developed by Dr. Fred Stephen at the University of Arkansas was used to predict additional spot growth. This was done for 12 of the spots that were sampled. The number of SPB spots predicted to have additional timber loss and the size of this loss are used to provide an indication of whether SPB losses will continue. A large number of SPB spots can be relatively unimportant if projected losses are small. Conversely, a few rapidly expanding SPB spots can cause tremendous timber losses.

- Volume of timber currently infested and ecomonic evaluation

  The volume of timber currently infested is calculated from the ground checked SPB spots. The currently infested volume is used in the Southern Pine Beetle Economic Evaluation Program (SPBEEP) to develop the economic benefits cost ratio, internal rate of return, targets for timber removed, and the volume of timber protected by control efforts. As the volume of timber currently infested with SPB increases, the economic benefits from a SPB suppression project also increase.

- Entomological judgment

  Professional experience of entomologists and general field observations while ground checking spots are used to help interpret and supplement the technical data to reach a final decision.

RESULTS AND DISCUSSION

A total of 52 multiple tree SPB infestations were recorded during the aerial survey. Eight spots were ground checked by FPM during the evaluation. Also included in the evaluation are three spots that were monitored throughout the summer for spot growth by FPM for a special project to validate spot growth models. The data are summarized in table 1.

The ground checked spots ranged in size from 7-301 trees (mean spot size was 80 trees). The number of SPB infested trees ranged from 2-101 trees (mean was 40 trees). The average ratio of green infested trees:red infested trees was 5.1:1. Most of the spots were expanding and contained trees with fresh attacks. Figure 1 shows the area of heaviest SPB activity. There is a total of 109,255 acres of susceptible host type for the portion of the ranger districts that were flown. There are 0.48 spots per 1,000 acres of host type.

Trend

Of the 11 spots included in the evaluation, 10 spots have green infested: red infested tree ratios greater than 1. The Arkansas Model predicted all but one of the spots would exhibit spot growth 30 days after the initial ground check. FPM monitored three of the spots (spots 1, 10, and 11) this summer for a special project "Application of Southern Pine Beetle Spot Growth Models in the Gulf Coastal Plain".

Spot 1 on the Catahoula started with an initial 56 trees on July 7, 1983, and affected a total of 603 trees by October 16. Spot 10 on the Winn started with 74 active trees on July 20 and affected 182 trees by September 6. Spot 11 on the Winn started with an initial 40 infested trees on August 25 and had affected a total of 58 trees by September 16.

Economic Analysis

An economic analysis was not done since the Kisatchie National Forest is not interested in submitting a project.

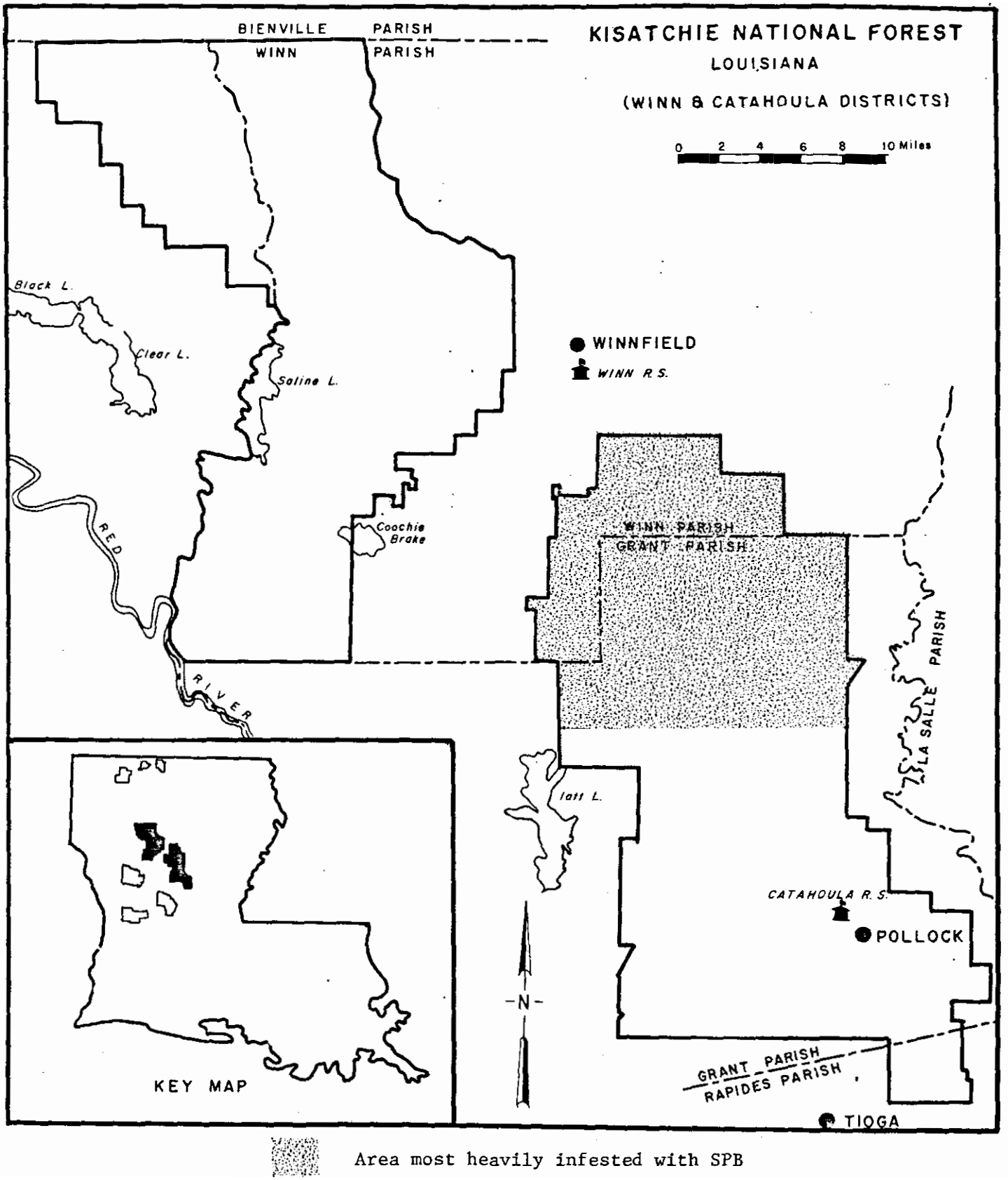
Hazard Rating

All of the infestations were in stands that rated high or medium risk to SPB attack (eight rated high and three medium). Lorio found in the Kisatchie National Forest that the majority of large SPB

Table 1. Results of ground check, hazard rating and spot growth for the southern pine beetle on the Catahoula and Winn Districts, Kisatchie National Forest.

Spot No.	Total No. Trees	Total Infested Trees	Green Infested Trees	Red Infested Trees	Total Vacated Trees	Percent Trees Infested	Green:Red Tree Ratio	Age	Total Basal Area	Pine Basal Area	Total Infested Trees in 30 Days (Stephen's Model)		Landform	SPB Hazard Rating
											Min.	Max.		
1	71	56	48	8	15	79.0	6.00	62	150	100	90	116	Bottom	Med
2	20	15	11	4	5	75.0	0.75	85	170	130	28	36	Bottom	High
3	82	22	4	18	60	27.0	0.27	51	200	160	35	45	Bottom	High
4	91	49	47	2	42	54.0	23.50	32	230	110	82	106	Bottom	High
5	7	3	2	1	4	43.0	2.00	25	150	140	3	5	Sideslope	High
6	301	101	96	5	200	34.0	19.20	65	130	100	159	203	Bottom	High
7	66	26	23	3	40	39.0	7.67	80	170	70	37	49	Bottom	Med
8	115	65	61	4	50	57.0	15.25	52	110	100	105	135	Sideslope	High
9	50	38	36	2	12	76.0	18.00	58	140	130	50	64	Sideslope	High
10	84	74	53	21	10	88.0	2.52	49	110	70	86	110	Bottom	Med
11	40	40	36	4	0	100.0	9.00	80	110	80	79	101	Sideslope	Med
Total	927	489	417	72	438	06.71	106.11	639	1670	1190				
Average			38	7	40	.52	5.80		152					

Fig. 1. Location of the heaviest southern pine beetle activity on the Winn and Catahoula Ranger Districts.



infestations occurred in loblolly pine stands that were mature sawtimber, well stocked, and on good sites (90 or better site index [Lorio and Sommers 1981]).

RECOMMENDATIONS

Based on the size, number of spots, and the predicted and observed SPB spot growth, FPM anticipates increased beetle losses next year on the Kisatchie National Forest. The present level of SPB activity on the Winn and Catahoula Ranger Districts indicate a SPB suppression project for these districts could be justified.

Appendix I describes a complete list of control alternatives for SPB spots.

REFERENCES

Drake, L. E. Evaluation of southern pine beetle infestations on the Kisatchie National Forest, Louisiana. Rep. No. SA 76-2-20. Pineville, LA; U.S. Department of Agriculture, Forest Service, Forest Insect and Disease Management. 1976. 7 p.

Lorio, P. L. Jr.; R. A. Sommers. Use of available resource data to rate stands for southern pine beetle risk. In: Hazard rating systems in forest insect pest management: Symposium proceedings. Gen. Tech. Rep. WO-27. U.S. Department of Agriculture, Forest Service; 1981: 75-78.

Appendix I

ALTERNATIVES FOR SOUTHERN PINE BEETLE CONTROL

Four alternatives are recommended for southern pine beetle control. The following discussion briefly outlines these alternatives (Swain & Remion 1980). For a more detailed description on conducting control procedures in a southern pine beetle suppression project refer to the Project Control Plan.

Alternative 1. Remove trees through salvage.

Salvage is the method most often used for stopping the growth of existing spots. This strategy involves removing a buffer strip of noninfested trees, all green infested and red infested trees, and if desired, the trees already killed by the beetles. Costs associated with removing uninfested trees are not charged to specifically designated SPB Project Control Funds since removing uninfested material is not needed for successful control even though it may be operationally desirable. The buffer strip should surround the recently attacked trees. It should be 40 to 70 feet wide for most active spots, while a 100-ft strip (and occasionally larger) may be needed for large, rapidly expanding spots. As a rule, the width of the buffer should not exceed the average height of the trees in the spot. The SPB spot should be carefully surveyed and all trees to be removed should be marked.

To implement this alternative the buffer strip should be cut first. All infested trees should then be cut. Vacated trees are cut last and are removed only for utilization purposes. All trees should be felled toward the center of the spot. The reason for this is to keep infested trees as far away from noninfested trees as possible. This reduces the chance of beetles killing additional trees.

Alternative 2. Piling and burning.

Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly charring the bark of infested trees. The entire bark surface must be thoroughly charred to insure effective control. The order of priority for cutting, piling, and burning infested trees, particularly in large spots, is the same for Alternative 1. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts", every effort should be made to locate and treat all green infested trees during the piling and burning operation.

Alternative 3. Cut-and-leave infested trees.

This is accomplished by felling a buffer strip and all infested trees toward the center of the spot. The purpose is to stop spot growth. Use of this method causes beetles to disperse at a time of year when this behavior is unnatural. This results in a reduction of mass attacked trees and spot growth ceases. Cut-and-leave should only be used in the summer (May 1 - September 30), since these are the only months beetles are not dispersing. It should only be used on small spots, normally 50 infested trees or less.

Alternative 4. Chemically treat infested trees.

In this method, infested trees are felled toward the center of the spot, cut into workable lengths, and sprayed with lindane or Dursban® 4E. The purpose of this method is to kill the beetle population. To be effective, all bark surfaces must be sprayed. This involves turning the logs which becomes more difficult as tree size increases.

Forest Pest Management, Alexandria Field Office, Pineville, LA, should be contacted prior to the extensive use of chemical control for an update on latest restrictions or application procedures.

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